it entire to the new museum at Oxford, where it now is. Amongst the specimens included are those which formed the subjects figured in my work on the Testudinata. I have to add that the few duplicates (for such they were) of the shells of tortoises at Cambridge are, most of them, of common occurrence in collections.

THOMAS BELL.

On Spatulemys Lasalæ, *a new Genus of* Hydraspidæ *from Rio Parana, Corrientes.* By Dr. J. E. GRAY, F.R.S. &c.

Colonel P. Perez de Lasala has kindly presented to the Museum a water-tortoise from Rio Parana, Corrientes, which has not been recorded in scientific catalogues. It differs from *Hydraspis* in the general form of the head and thorax, and in the head being entirely covered with small shields. It is like *Hydromedusa* in many particulars, especially in the thorax of one sex at least being concave; but it has a regular small nuchal plate.

SPATULEMYS.

Thorax oblong, elongate, depressed, with a distinct elongate nuchal plate. First vertebral plate very broad; second, third, and fourth longer than broad; anterior marginal plates broad; the second and ninth largest, angular above. The sternum elongate, broad and rounded in front, deeply notched behind; gular plate large, marginal. Head broad, depressed, entirely covered with small polygonal shields; forehead convex, rhombic, with a broad flat crown between the very large temporal muscles; chin with two beards; mouth broad and rounded in front. The two outer hinder claws very small, rudimentary. Tail conical. Sternum in male (?) slightly concave, especially behind.

Spatulemys Lasalæ.

Shell above olive, nearly uniform, with a few small black spots on the margin, which are more abundant and larger on the hinder plates. Thorax and underside of margin pale, with symmetrical black spots, which are largest on the front and sides of thorax. Length of thorax 15 in., breadth 8½ in.; length of head 2½ in.

Hab. Rio Parana, Corrientes (Colonel P. Perez de Lasala, November 5, 1872).

Observations on the Metamorphoses of the Bony Fishes in general, and especially on those of a small Chinese Fish, of the Genus Macropoda, *recently introduced into France.* By M. N. JOLY.

In a letter addressed to M. H. Milne-Edwards on the 24th of December 1864, M. Agassiz expressed himself as follows:—"I have lately observed among fishes metamorphoses as considerable as those which are known among reptiles. Now-a-days, when pisciculture is pursued with such success and on so large a scale, it is surprising that this fact has not long since been observed"*.

* See Ann. des Sci. Nat. 5e sér. tom. iii. p. 55.

By the kindness of M. Guy, who is successfully rearing a pair of *Macropodæ* in his magnificent aquarium of the Faubourg Saint-Cyprien, I have been able to study, not only the nidification of this handsome fish, but also its ova and their development, which is so rapid that I have seen them hatched in sixty hours. I shall not enter into long details as to the embryogeny of our *Macropodæ*, as I have the intention of soon making known all its phases, with numerous drawings to illustrate them. It will be sufficient at present to say that the development of our little Chinese fishes presents much analogy with that of the perch, which was so well studied by our colleague Lereboullet. I shall therefore at present confine myself to the most striking features.

The ovum of the *Macropoda*, which is of the size of a poppy-seed at the time of its being deposited, is distinguished by its perfect transparency and its density, which is inferior to that of water. Hence it rises of itself to the surface and comes into contact with the air-bubbles which compose the nest fabricated by the male, or which are expelled from his mouth when he respires. We have already stated that the embryogenic work which has to be accomplished within the ovum does not last longer than from sixty to sixty-five hours; but rapid as the hatching is, it is not more so than that of the tench and some other fishes. But it will be easily understood that, in consequence of this rapid developmemt, the animal must be born in a very imperfect state. In point of fact it presents the form of an obese tadpole, the head and trunk of which are applied to an enormous umbilical vesicle, whilst the tail is free, already very mobile, and furnished all round with an extremely transparent natatory membrane.

Although it appears to be completely destitute of striated muscular fibres, the animal wriggles briskly upon the object-slide. It is about $1\frac{1}{2}$ millim. in length.

Its head is remarkable by the existence of two large eyes still destitute of pigment. The mouth does not yet exist. This is also the case with the intestine and the anus. But the heart has already been in motion for more than twelve hours, and there is an active circulation in a part of the tail (nearly the anterior half), in the vitelline vesicle, and in the remainder of the body. There are no branchiæ; the respiration is effected by means of the skin and the umbilical vesicle; there are no secretory organs of bile or urine, no genital organs, and no fins properly so called.

As in all fishes and, indeed, in all Vertebrata, the nervous system, which is very early formed, consists of two parallel cords which swell out in the head to give origin to the cerebral vesicles. The skeleton is as yet represented only by the *chorda dorsalis*; the vertebral laminæ, if they exist, are not yet very distinct.

Numerous pigment-spots are to be seen upon all parts of the body, and even upon the umbilical vesicle.

Many organs which do not yet exist will appear sooner or later after birth. Of this number are the mouth, the intestine, the liver, the swimming-bladder (at least in the perch); the genito-

urinary organs, the hyoid apparatus, and especially the branchiæ will be formed. The circulation which took place in the umbilical vesicle, a provisional respiratory organ, will cease. New vessels will appear and others will become atrophied; the *chorda dorsalis* and the sheath which surrounds it will become solidified to produce the bodies of the vertebræ. The true or permanent fins, at first reduced to two pectoral palettes which the animal agitates very rapidly, will originate in the interior and at the expense of the embryonic caudal membrane or fin; finally brilliant iridescent scales will cover the body of the animal, which, from this moment, will appear under the form belonging to the adult age.

Such is, briefly, the series of changes which will be manifested at various intervals in our new-born fish. These changes are exactly of the same nature and at least as considerable and numerous as those which occur in *Petromyzon Planeri*, in the Insects, or in the Crustacea (*Caridina Desmarestii*, *Cancer pagurus*, &c.). Formation of new parts (mouth, intestine, branchial apparatus, genito-urinary apparatus, permanent fins, vertebral arches), disappearance of parts previously existing (vitelline vesicle and its vessels, embryonic caudal membrane), modifications in the form of the body, in that of the heart and in its structure (which was at first entirely cellular), in the eyes (originally destitute of pigment and becoming movable instead of immovable as at first), &c. &c. Now *formation*, *disappearance*, and *modification* are the three essential modes which are included, according to Dugès, in that very complex operation that we call *metamorphosis*; and if I am not deceived, the embryogeny of the *Macropoda* has displayed them to us.

To accept the reality of metamorphosis in the case of the grasshopper for example, and the other Orthoptera or Hemiptera which *quit the egg with all their parts except the wings*, and to refuse to believe in this phenomenon when we have to do with osseous fishes such as the perch or the *Macropoda*, would, it seems to me, be to show a deficiency of logic and to close our eyes voluntarily against evidence.—*Comptes Rendus*, Sept. 30, 1872, p. 766.

On the Habits of Terebratulæ, *or Lamp-shells.*

By Dr. J. E. Gray, F.R.S. &c.

Mr. Davidson informs me that the shell I have named *Terebratula truncata* in the 'Annals and Magazine of Natural History' for 1872 (x. p. 152) is what is now called *Kraussia rubra* (*T. rubra*, Pallas). He also informs me that "Mr. Jeffreys found a number of specimens of *Terebratulina caput-serpentis* attached to seaweed; and he believes some forms of *Argiope* that occur in the Mediterranean likewise affix themselves to seaweed."

On referring to Mr. Jeffreys's 'British Conchology,' ii. p. 15, he says, "*T. caput-serpentis* is attached to stones, old shells, and occasionally to small seaweeds and other substances;" and Mr. Davidson informs me that "Prof. E. Forbes had found some small specimens